APERTURE COMPARISON BETWEEN THE AGS AND THE BOOSTER

Booster Technical Note

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The AGS horizontal aperture is limited at the sextupoles at the 13 straight sections, at the locations of the F5 extraction septum magnet, and at H5 extraction fast kicker. The beta functions at the locations are 22 m. The physical aperture at the locations are 5 inches (127 mm). The vertical aperture is limited at virtually all vertical beta maximum (22 m) and physical size 70 mm. In the table below, we attempt to match those physical size into the Booster aperture. The numbers are for the location where the beta function is maximum for both machines.

TABLE

	HORIZONTAL	VERTICAL
FOR THE AGS (BETA MAX. =22m)		
PHYSICAL SIZE	127 mm	70 mm
CLOSED ORBIT ERROR	10 mm	5 mm
MOMENTUM SPREAD .5%	13.5 mm	0 mm
BETATRON APERTURE	103.5 mm	65 mm
BETATRON ADMITTANCE	$122\pi \times 10^{-6}$	$48\pi \times 10^{-6}$
FOR THE BOOSTER (BETA MAX.=14m)		
BETATRON ADMITTANCE	$122\pi \times 10^{-6}$	$48\pi \times 10^{-6}$
BETATRON APERTURE	83 mm	52 mm
MOMENTUM SPREAD .5%	14.8 mm	0 mm
CLOSED ORBIT ERROR	10 mm	5 mm
TOTAL APP. REQUIRED	107.8 mm	57 mm

As can be seen in the table, in order to have same admittance with the AGS the Booster requires the physical aperture of 108 x 57 mm. The vertical aperture of the Booster is 66 mm which is 9 mm more than required, and no obstructions like septum magnets or H^- stripping foil be placed within 54 mm (2.13 inches) of the center line if we do not utilize any slow orbit bumps. However, if one employs the slow orbit bumps, one can place the devices as close as 32 mm from the center line without limiting acceptance matching the AGS. The Booster horizontal physical aperture of ±76 mm is large enough to accommodate either bumped or unbumped placement of the injection or extraction equipments.